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1. [arXiv:2301.01397](#) [pdf, other] hep-th math-ph

Vortex in the vacuumless sigma-cuscuton-like model

Authors: F. C. E. Lima, C. A. S. Almeida

Abstract: Building a multi-field theory with canonical and non-canonical contributions, one studies the vortex configurations of the $O(3)$ -sigma model. We propose a model constituted by an $O(3)$ -sigma field, a cuscuton-like neutral scalar field, and Maxwell's field. We investigate BPS properties considering a vacuumless theory using first-order formalism. Although the theory does not have a vacuum, in each to... [More](#)

Submitted 3 January, 2023; **originally announced** January 2023.

Comments: 17 pages, 4 captioned figures

2. [arXiv:2212.09773](#) [pdf, other] quant-ph cond-mat.mtrl-sci physics.app-ph

Quantum random number generation based on a perovskite light emitting diode

Authors: Joakim Argillander, Alvaro Alarcón, Chunxiong Bao, Chaoyang Kuang, Gustavo Lima, Feng Gao, Guilherme B. Xavier

Abstract: The recent development of perovskite light emitting diodes (PeLEDs) has the potential to revolutionize the fields of optical communication and lighting devices, due to their simplicity of fabrication and outstanding optical properties. Here we demonstrate, for the first time, that PeLEDs can also be used in the field of quantum technologies by demonstrating a highly-secure quantum random number ge... [More](#)

Submitted 19 December, 2022; **originally announced** December 2022.

Comments: 9 pages, 7 figures

3. [arXiv:2212.09231](#) [pdf, other] cond-mat.stat-mech physics.soc-ph

Epidemic Outbreaks on Quenched Scale-Free Networks

Authors: D. S. M. Alencar, T. F. A. Alves, F. W. S. Lima, G. A. Alves, A. Macedo-Filho, R. S. Ferreira

Abstract: We present a finite-size scaling theory of a contact process with permanent immunity on uncorrelated scale-free networks. We model an epidemic outbreak by an analog of the susceptible-infected-removed model where an infected individual attacks only one susceptible in a time unit in a way we can expect a non-vanishing critical threshold at scale-free networks. As we already know, the susceptible-in... [More](#)

Submitted 18 December, 2022; **originally announced** December 2022.

4. [arXiv:2212.09208](#) [[pdf](#), [other](#)] [quant-ph](#) [hep-th](#)

Entropic information of a particle trapped by the Aharonov-Bohm-type effect

Authors: [N. Ali](#), [C. A. S. Almeida](#), [C. O. Edet](#), [F. C. E. Lima](#), [A. R. P. Lima](#)

Abstract: In this research article, we use the Shannon's formalism to investigate the quantum information entropy of a particle trapped by the Aharonov-Bohm-type effect. For quantum information study, it is necessary to investigate the eigenstates of the quantum system, i. e., the wave functions and energies of the quantum states. We assumed that the particle is in principle, confined in a cylindrical box i... [▼ More](#)

Submitted 22 December, 2022; **v1** submitted 18 December, 2022; **originally announced** December 2022.

Comments: 13 pages, 2 captioned figures. Addition of a funding source to acknowledgments in this version

5. [arXiv:2212.08948](#) [[pdf](#), [other](#)] [gr-qc](#) [hep-th](#)

Geometrically contracted structure in teleparallel $f(T)$ gravity

Authors: [A. R. P. Moreira](#), [F. C. E. Lima](#), [C. A. S. Almeida](#)

Abstract: In the teleparallel $f(T)$ gravity scenario, we consider a five-dimensional thick brane. This scenario is interesting because this theory can provide explanations for inflation, radiation, and dark matter under certain conditions. It is convenient to assume, for our study, a polynomial profile of the function $f(T)$. Indeed, some polynomial profiles can produce internal structures for which a bran... [▼ More](#)

Submitted 17 December, 2022; **originally announced** December 2022.

Comments: 22 pages, 15 captioned figures. To appear in International Journal of Modern Physics D

6. [arXiv:2212.08866](#) [[pdf](#), [ps](#), [other](#)] [math.PR](#)

Geometric decomposition of flows generated by rough path differential equations

Authors: [Pedro Catuogno](#), [Lourival Lima](#), [Paulo Ruffino](#)

Abstract: Whenever an Itô-Wentzel type of formula holds for composition of flows of a certain differential dynamics, there exists locally a decomposition of the corresponding flow according to complementary distributions (or foliations, in the case of integrability of these distributions). Many examples have been proved in distinct context of dynamics: Stratonovich stochastic equations, Lévy driven noise, I... [▼ More](#)

Submitted 17 December, 2022; **originally announced** December 2022.

MSC Class: 60L20; 37H05; 37C10 (60L90)

7. [arXiv:2212.06450](#) [[pdf](#), [other](#)] [math-ph](#) [math.PR](#) [math.RA](#)

Infinite-dimensional genetic and evolution algebras generated by Gibbs measures

Authors: [Cristian F. Coletti](#), [Lucas R. de Lima](#), [Denis A. Luiz](#)

Abstract: Genetic and evolution algebras arise naturally from applied probability and stochastic processes. Gibbs measures describe interacting systems commonly studied in thermodynamics and statistical mechanics with applications in several fields. Here, we consider that the algebras are determined by configurations of finite spins on a countable set with their associated Gibbs distributions. The model pre... [▼ More](#)

Submitted 13 December, 2022; **originally announced** December 2022.

Comments: 26 pages, 4 figures

MSC Class: 17C92; 17D99; 82B20

8. [arXiv:2212.06260](#) [[pdf](#), [other](#)] [hep-ph](#) [hep-th](#)

Exploring the vacuum structure of gravitationally induced neutrino masses

Authors: [Carlos Henrique de Lima](#), [Daniel Stolarski](#)

Abstract: In this work, we explore the proposed mechanism in which the gravitational θ anomaly generates neutrino masses. We highlight that the leading renormalizable interactions of the neutrino condensate forbid the possibility of generating hierarchical masses consistent with observation. This conclusion still holds when Standard Model loop corrections are accounted for. We show that higher-dimensional... [▼ More](#)

Submitted 12 December, 2022; **originally announced** December 2022.

9. [arXiv:2212.06064](#) [[pdf](#), [other](#)] [cs.AI](#)

Reinforcement Learning Applied to Trading Systems: A Survey

Authors: [Leonardo Kanashiro Felizardo](#), [Francisco Caio Lima Paiva](#), [Anna Helena Real Costa](#), [Emilio Del-Moral-Hernandez](#)

Abstract: Financial domain tasks, such as trading in market exchanges, are challenging and have long attracted researchers. The recent achievements and the consequent notoriety of Reinforcement Learning (RL) have also increased its adoption in trading tasks. RL uses a framework with well-established formal concepts, which raises its attractiveness in learning profitable trading strategies. However, RL use w... [▽ More](#)

Submitted 1 November, 2022; **originally announced** December 2022.

Comments: 38 pages

10. [arXiv:2212.05863](#) [[pdf](#), [other](#)] [cond-mat.mtrl-sci](#)

Topological insulating phase arising in transition metal dichalcogenide alloy

Authors: F. Crasto de Lima, B. Focassio, R. H. Miwa, A. Fazzio

Abstract: Transition metal dichalcogenides have been the subject of numerous studies addressing technological applications and fundamental issues. Single-layer PtSe₂ is a semiconductor with a trivial bandgap, in contrast, its counterpart with 25% of Se atoms substituted by Hg, Pt₂HgSe₃ (jacutingaite, a naturally occurring mineral), is a 2D topological insulator with a large bandgap. Based on ab-initio calcu... [▽ More](#)

Submitted 12 December, 2022; **originally announced** December 2022.

11. [arXiv:2212.05324](#) [[pdf](#), [other](#)] [hep-th](#) [nlin.PS](#)

Differential configurational entropy for multi-field of the φ^6 theory

Authors: F. C. E. Lima, C. A. S. Almeida

Abstract: The topological structures of a φ^6 theory with multi-field are studied. The φ^6 theory is interesting because it is a theory that allows the shrinkage of topological structures generating double-kink or even multi-kink configurations. In this work, we consider and study the solutions of a two real scalar fields model. To reach our purpose, we investigate the BPS properties of the fields using... [▽ More](#)

Submitted 10 December, 2022; **originally announced** December 2022.

Comments: 15 pages, 7 captioned figures. To appear in Europhysics Letters

12. [arXiv:2212.03734](#) [[pdf](#), [other](#)] [astro-ph.CO](#)

Non-local contribution from small scales in galaxy-galaxy lensing: Comparison of mitigation schemes

Authors: J. Prat, G. Zacharegkas, Y. Park, N. MacCrann, E. R. Switzer, S. Pandey, C. Chang, J. Blazek, R. Miquel, A. Alarcon, O. Alves, A. Amon, F. Andrade-Oliveira, K. Bechtol, M. R. Becker, G. M. Bernstein, R. Chen, A. Choi, H. Camacho, A. Campos, A. Carnero Rosell, M. Carrasco Kind, R. Cawthon, J. Cordero, M. Crocce, et al. (90 additional authors not shown)

Abstract: Recent cosmological analyses with large-scale structure and weak lensing measurements, usually referred to as 3×2 pt, had to discard a lot of signal-to-noise from small scales due to our inability to precisely model non-linearities and baryonic effects. Galaxy-galaxy lensing, or the position-shear correlation between lens and source galaxies, is one of the three two-point correlation functio... [▽ More](#)

Submitted 7 December, 2022; **originally announced** December 2022.

Comments: 9+3 pages, 3+3 figures. To be submitted to MNRAS

Report number: FERMILAB-PUB-22-909-PPD

13. [arXiv:2212.03275](#) [[pdf](#), [other](#)] [physics.flu-dyn](#) [cond-mat.soft](#) [physics.geo-ph](#) [doi](#) [10.1063/5.0121810](#)

Grain-scale computations of barchan dunes

Authors: Nicolao Cerqueira Lima, Willian Righi Assis, Carlos Azael Alvarez, Erick de Moraes Franklin

Abstract: Barchans are crescent-shaped dunes commonly found in diverse environments and scales: from the 10-cm-long barchans found under water to the 1-km-long barchans on Mars, passing by the 100-m-long dunes on Earth's deserts. Although ubiquitous in nature, there is a lack of grain-scale computations of the growth and evolution of those bedforms. In this paper, we investigate the values of grain properti... [▽ More](#)

Submitted 6 December, 2022; **originally announced** December 2022.

Comments: This article may be downloaded for personal use only. Any other use requires prior permission of the author and AIP Publishing. This article appeared in Phys. Fluids 34, 123320 (2022) and may be found at <https://doi.org/10.1063/5.0121810>

Journal ref: Phys. Fluids 34, 123320 (2022)

14. [arXiv:2212.03104](#) [[pdf](#), [ps](#), [other](#)] [math.GR](#)

On LC-subgroup of a periodic group

Authors: M. Amiri, I. Kashuba, I. Lima

Abstract: As a natural continuation of study *LCM*-groups, we explore other properties of *LCM*-groups and *LC*-series. We obtain some characterizations of finite groups which are not *LCM*-groups but all proper sections are *LCM*-groups. Also, for a *p*-group *G*, we prove that *G* is a *LC*-nilpotent group and we obtain a bound for its *LC*-nilpotency. Finally, as an application, we prove that a finite supe... [▼ More](#)

Submitted 4 December, 2022; originally announced December 2022.

15. [arXiv:2212.00492](#) [[pdf](#), [other](#)] [cs.IR](#) [doi](#) [10.1145/3459637.3482287](#)

Principled Multi-Aspect Evaluation Measures of Rankings

Authors: [Maria Maistro](#), [Lucas Chaves Lima](#), [Jakob Grue Simonsen](#), [Christina Lioma](#)

Abstract: Information Retrieval evaluation has traditionally focused on defining principled ways of assessing the relevance of a ranked list of documents with respect to a query. Several methods extend this type of evaluation beyond relevance, making it possible to evaluate different aspects of a document ranking (e.g., relevance, usefulness, or credibility) using a single measure (multi-aspect evaluation).... [▼ More](#)

Submitted 1 December, 2022; originally announced December 2022.

16. [arXiv:2211.15314](#) [[pdf](#), [other](#)] [math.CO](#) [math.SP](#)

On graphs with eigenvectors in $\{1, -1, 0\}$ and the max k -cut problem

Authors: [Jorge Alencar](#), [Leonardo de Lima](#), [Vladimir Nikiforov](#)

Abstract: In this paper, we characterize all graphs with eigenvectors of the signless Laplacian and adjacency matrices with components equal to $\{-1, 0, 1\}$. We extend the graph parameter max k -cut to square matrices and prove a general sharp upper bound, which implies upper bounds on the max k -cut of a graph using the smallest signless Laplacian eigenvalue, the smallest adjacency eigenvalue, and the... [▼ More](#)

Submitted 25 November, 2022; originally announced November 2022.

17. [arXiv:2211.13804](#) [[pdf](#)] [cs.HC](#) [cs.CL](#)

On the Linguistic and Computational Requirements for Creating Face-to-Face Multimodal Human-Machine Interaction

Authors: [João Ranhel](#), [Cacilda Vilela de Lima](#)

Abstract: In this study, conversations between humans and avatars are linguistically, organizationally, and structurally analyzed, focusing on what is necessary for creating face-to-face multimodal interfaces for machines. We videorecorded thirty-four human-avatar interactions, performed complete linguistic microanalysis on video excerpts, and marked all the occurrences of multimodal actions and events. Sta... [▼ More](#)

Submitted 24 November, 2022; originally announced November 2022.

18. [arXiv:2211.12349](#) [[pdf](#), [ps](#), [other](#)] [gr-qc](#) [hep-th](#)

Black string bounce to traversable wormhole

Authors: [A. Lima](#), [G. Alencar](#), [J. Furtado](#)

Abstract: In this work, a regular black string solution will be presented from the method used by Simpson-Visser to regularize the Schwarzschild solution. As in the Simpson-Visser work, in this new black string solution, it is possible to represent both a regular black hole and a wormhole just by changing the value of a parameter " α " used in its metric. Tensors and curvature invariants were analyzed to ve... [▼ More](#)

Submitted 22 November, 2022; originally announced November 2022.

Comments: 8 pages, 6 figures

19. [arXiv:2211.10809](#) [[pdf](#), [ps](#), [other](#)] [stat.ME](#)

Heuristic Algorithm for Univariate Stratification Problem

Authors: [José Brito](#), [Gustavo Semaan](#), [Leonardo de Lima](#), [Augusto Fadel](#)

Abstract: In sampling theory, stratification corresponds to a technique used in surveys, which allows segmenting a population into homogeneous subpopulations (strata) to produce statistics with a higher level of precision. In particular, this article proposes a heuristic to solve the univariate stratification problem - widely studied in the literature. One of its versions sets the number of strata and the p... [▼ More](#)

Submitted 19 November, 2022; originally announced November 2022.

Comments: 25 pages and 7 figures

MSC Class: 68R01

20. [arXiv:2211.09886](#) [[pdf](#), [other](#)] [gr-qc](#) [astro-ph.HE](#) [doi](#) [10.1140/epjc/s10052-022-10576-7](#)

Scalar scattering by black holes and wormholes

Authors: [Haroldo C. D. Lima Junior](#), [Carolina L. Benone](#), [Luís C. B. Crispino](#)

Abstract: We study the scattering of monochromatic planar scalar waves in a geometry that interpolates between the Schwarzschild solution, regular black holes and traversable wormhole spacetimes. We employ the partial waves approach to compute the differential scattering cross section of the regular black hole, as well as of the wormhole solutions. We compare our full numerical results with the classical ge... [▽ More](#)

Submitted 17 November, 2022; **originally announced** November 2022.

Journal ref: Eur. Phys. J. C 82 (2022) 7, 638

21. [arXiv:2211.09874](#) [[pdf](#), [ps](#), [other](#)] [math.AG](#) [math.CO](#)

Certified Severi dimensions for hyperelliptic and supersymmetric cusps

Authors: [Ethan Cotterill](#), [Vinícius Lima](#), [Renato Vidal Martins](#), [Alexandre Reis](#)

Abstract: In a previous paper, the first three authors formulated a precise conjecture about the dimension of the {\it generalized Severi variety} $M_{d,g;\mathbb{S},\mathbf{k}}^n$ of degree- d holomorphic maps $\mathbb{P}^1 \rightarrow \mathbb{P}^n$ whose images' singularities are singleton cusps with value semigroups $\mathbb{S}$ and ramification profiles $\mathbf{k}$. In this paper, we prove that an adjusted form... [▽ More](#)

Submitted 17 November, 2022; **originally announced** November 2022.

Comments: 18 pages; preliminary version, comments welcome

MSC Class: 14H20; 14H45; 14H51; 20Mxx

22. [arXiv:2211.09380](#) [[pdf](#), [other](#)] [math.NA](#) [cs.DC](#)

Multilayer Perceptron-based Surrogate Models for Finite Element Analysis

Authors: [Lawson Oliveira Lima](#), [Julien Rosenberger](#), [Esteban Antier](#), [Frederic Magoules](#)

Abstract: Many Partial Differential Equations (PDEs) do not have analytical solution, and can only be solved by numerical methods. In this context, Physics-Informed Neural Networks (PINN) have become important in the last decades, since it uses a neural network and physical conditions to approximate any functions. This paper focuses on hypertuning of a PINN, used to solve a PDE. The behavior of the approxim... [▽ More](#)

Submitted 17 November, 2022; **originally announced** November 2022.

23. [arXiv:2211.05279](#) [[pdf](#), [ps](#), [other](#)] [math.AT](#)

Borsuk-Ulam property for graphs

Authors: [Daciberg Lima Gonçalves](#), [Jesús González](#)

Abstract: For finite connected graphs Γ and G , with Γ admitting a free involution τ , we characterize the based homotopy classes $\alpha \in [\Gamma, G]$ for which the Borsuk-Ulam property holds in the sense of Gonçalves, Guaschi and Castaluber-Laass, i.e., the homotopy classes α so that each of its representatives $f \in \alpha$ satisfies $f(x) = f(\tau \cdot x)$ for some $x \in \Gamma$. This is attained through a graph-braid-g... [▽ More](#)

Submitted 9 November, 2022; **originally announced** November 2022.

Comments: 11 pages, 2 figures

MSC Class: 55M20; 57Q70 (Primary) 20F36; 55R80; 57S25 (Secondary)

24. [arXiv:2211.05017](#) [[pdf](#)] [physics.ao-ph](#)

MAGAL Constellation -- Using a Small Satellite Altimeter Constellation to Monitor Local and Regional Ocean and Inland Water Variations

Authors: [André G. C. Guerra](#), [André João](#), [Miguel Arantes](#), [Miguel Martin](#), [Paulo Figueiredo](#), [Alexander Costa](#), [Catarina M. Cecilio](#), [Inês Castelão](#), [Clara Lázaro](#), [Joana Fernandes](#), [A. Marques](#), [K. Brandão](#), [P. Lima](#), [Yaroslav Mashtakov](#), [Anna Guerman](#), [Catharina Pieper](#), [Ana Martins](#), [Burke O. Fort](#), [Timothy J. Urban](#), [Byron D. Tapley](#), [Brandon A. Jones](#)

Abstract: MAGAL lays the foundations for a future constellation of small satellites carrying radar altimeters aiming to improve the understanding of ocean circulation variability at local, regional, and global scales. All necessary tools will be developed, including a new small, low-power altimeter payload and a miniaturized satellite platform, grounded on the Space 4.0 industry, to be manufactured inseries... [▽ More](#)

Submitted 9 November, 2022; **originally announced** November 2022.

Comments: 15 pages, 7 figures, Manuscript presented at the 45 Symposium 2022, Vilamoura, Portugal, 16 - 20 May 2022

25. [arXiv:2211.03918](#) [[pdf](#), [other](#)] [math.DG](#)

Translators to Higher Order Mean Curvature Flows in $\mathbb{R}^n \times \mathbb{R}$ and $\mathbb{H}^n \times \mathbb{R}$

Authors: [Ronaldo F. de Lima](#), [Giuseppe Pipoli](#)

Abstract: We consider translators to the extrinsic flows defined by the higher order mean curvatures H_r (r -MCF, for short) in $\mathbb{R}^n \times \mathbb{R}$ and $\mathbb{H}^n \times \mathbb{R}$, where $n \geq 2$ and $r \in \{1, \dots, n-1\}$. We show that there exist rotational bowl-type and translating catenoid-type translators to r -MCF in both $\mathbb{R}^n \times \mathbb{R}$ and $\mathbb{H}^n \times \mathbb{R}$, and... [▼ More](#)

Submitted 7 November, 2022; **originally announced** November 2022.

26. [arXiv:2211.02702](#) [[pdf](#), [other](#)] [hep-th](#)

On generalised D1-D5 near horizons and their spectra

Authors: [Mariana Lima](#), [Niall T. Macpherson](#), [Dmitry Melnikov](#), [Luis Ypanaque](#)

Abstract: There has been considerable recent interest in type II string compactifications on $\text{AdS}_3 \times S^3 \times M_4$ due to both new progress in the $\text{AdS}_3/\text{CFT}_2$ correspondence and an independent search for new $\mathcal{N} = (4, 0)$ supergravity solutions. In this work we report a new family of small $\mathcal{N} = (4, 0)$ preserving warped $\text{AdS}_3 \times S^3 \times \text{CY}_2$ compactifications of type IIB super... [▼ More](#)

Submitted 4 November, 2022; **originally announced** November 2022.

Comments: 28 pages + appendices

27. [arXiv:2211.02428](#) [[pdf](#)] [astro-ph.SR](#) [astro-ph.EP](#) [astro-ph.IM](#)

Fractal signature as a rotational modulation and stellar noise classifier based on the active Kepler stars

Authors: [Paulo Cleber Farias da Silva Filho](#), [Jose Ribamar Dantas Silveira Junior](#), [Bricio Warney de Freitas Alves](#), [Fernando Jose Silva Lima Filho](#), [Vitor Marcelo Belo Ferreira](#), [Luiz Daniel Alves Rios](#), [Thiago de Melo Santiago](#), [Daniel Brito de Freitas](#)

Abstract: In this study, we report on the analysis of 701 stars in a solar vicinity defined in three categories namely subsolar, solar, and supersolar with rotation periods between 1 and 70 days, based on rotational modulation signatures inferred from time series from the Kepler mission's Public Archives. In our analysis, we performed an initial selection based on the rotation period and position in the per... [▼ More](#)

Submitted 4 November, 2022; **originally announced** November 2022.

Comments: 18 pages, 5 figures, submitted to BJD

28. [arXiv:2211.02194](#) [[pdf](#), [ps](#), [other](#)] [math.PR](#)

Brownian particle in the curl of 2-d stochastic heat equations

Authors: [Guilherme L. Feltas](#), [Hendrik Weber](#)

Abstract: We study the long time behaviour of a Brownian particle evolving in a dynamic random environment. Recently, [G. Cannizzaro, L. Haunschmid-Sibitz, F. Toninelli, preprint arXiv:2106.06264] proved sharp $\sqrt{\log}$ -super diffusive bounds for a Brownian particle in the curl of (a regularisation of) the 2-d Gaussian Free Field (GFF) ω . We consider a one parameter family of Markovian and Ga... [▼ More](#)

Submitted 3 November, 2022; **originally announced** November 2022.

Comments: 26 pages

MSC Class: Primary 82C27; 60H10

29. [arXiv:2210.17317](#) [[pdf](#), [ps](#), [other](#)] [physics.class-ph](#) [physics.flu-dyn](#)

A short note on the buoyant force in nonuniform gravitational fields

Authors: [Pier Franco Nali](#)

Abstract: [Lima](#) and Monteiro [1] derived the buoyant force in a nonuniform gravitational field by applying a gradient version of the divergence theorem to the surface integral of the pressure forces [2]. Here it is outlined an alternate approach in the framework of fluid mechanics, based on the energy formulations of the equations of state for compressible fluids.

Submitted 26 October, 2022; **originally announced** October 2022.

Comments: 4 pages, accepted for publication in the Revista Brasileira de Ensino de Física

30. [arXiv:2210.16491](#) [math.DS](#)

Irregular sets carry full metric mean dimension

Authors: [Chunlin Liu](#), [Xue Liu](#)

Abstract: Let (X, d) be a compact metric space, $f : X \rightarrow X$ be a continuous transformation with the specification property and $\varphi : X \rightarrow \mathbb{R}$ be a continuous function. We consider the set (called the irregular set for φ) of points for which the Birkhoff average of φ does not exist and show that this set is either empty or carries full Bowen upper and lower metric mean dimensi... [▼ More](#)

Submitted 2 November, 2022; v1 submitted 29 October, 2022; originally announced October 2022.

Comments: The main result in this paper has been covered by Theorem E in [Lima, Heides; Varandas, Paulo, On the rotation sets of generic homeomorphisms on the torus T^d , Ergodic Theory Dynam. Systems 41(2021), no. 10, 2983-3022.]

MSC Class: Primary:37A35; 37C45. Second:37B05

31. [arXiv:2210.15506](#) [pdf, other] quant-ph cs.PL

Programming with Quantum Mechanics

Authors: Evandro C. R. da Rosa, Claudio Lima

Abstract: Quantum computing is an emerging paradigm that opens a new era for exponential computational speedup. Still, quantum computers have yet to be ready for commercial use. However, it is essential to train and qualify today the workforce that will develop quantum acceleration solutions to get the quantum advantage in the future. This tutorial gives a broad view of quantum computing, abstracting most o... [▽ More](#)

Submitted 27 October, 2022; originally announced October 2022.

32. [arXiv:2210.11976](#) [pdf, other] quant-ph cond-mat.stat-mech

Unveiling the Markovian to non-Markovian transition with quantum collision models

Authors: Willames F. Magalhães, Carlos O. A. Ribeiro Neto, Bertúlio de Lima Bernardo

Abstract: The concept of non-Markovianity in open quantum systems is traditionally associated with the existence of information backflows from the environment to the system. Meanwhile, the mechanisms through which such backflows emerge are still a subject of debate. In this work, we use collision models to study memory effects in the dynamics of a qubit system in contact with a thermal bath made up of few a... [▽ More](#)

Submitted 21 October, 2022; originally announced October 2022.

Comments: 24 pages, 8 figures

33. [arXiv:2210.11548](#) [pdf, other] physics.bio-ph physics.chem-ph

Quantum Biochemical Analysis of the TtgR Regulator and Effectors

Authors: E. G. C. Matias, K. S. Bezerra, A. H. Lima Costa, W. S. Clemente, J. I. N. Oliveira, L. A. Ribeiro Junior, D. S. Galvao, U. L. Fulco

Abstract: The recent expansion of multidrug-resistant (MDR) pathogens poses significant challenges in treating healthcare-associated infections. Although antibacterial resistance occurs by numerous mechanisms, active efflux of the drugs is a critical concern. A single species of efflux pump can produce a simultaneous resistance to several drugs. One of the best-studied efflux pumps is the TtgABC: a triparti... [▽ More](#)

Submitted 20 October, 2022; originally announced October 2022.

Comments: 28 pages

MSC Class: 92-XX **ACM Class:** D.1.m; J.2; J.3; I.6.0

34. [arXiv:2210.10942](#) [pdf, ps, other] math-ph math.NT

Lecture notes on Legendre polynomials: their origin and main properties

Authors: F. M. S. Lima

Abstract: As is well-known, the separation of variables in second order partial differential equations (PDEs) for physical problems with spherical symmetry usually leads to Cauchy's differential equation for the radial coordinate r and Legendre's differential equation for the polar angle θ . For eigenvalues of the form $n(n+1)$, $n \geq 0$ being an integer, Legendre's equation admits certain polynomia... [▽ More](#)

Submitted 19 October, 2022; originally announced October 2022.

Comments: These notes may be useful for those interested in understanding Legendre polynomials in the frame of mathematical physics. They may also be useful for those interested in shifted Legendre polynomials and their application on irrationality proofs

MSC Class: 42C10

35. [arXiv:2210.10727](#) [pdf, other] math.CA nlin.SI

Bidiagonal factorization of tetradiagonal matrices and Darboux transformations

Authors: Amílcar Branquinho, Ana Foulquié-Moreno, Manuel Mañas

Abstract: ...theorem for bounded banded lower Hessenberg matrices that admit a positive bidiagonal factorization was presented. These type of matrices are oscillatory. In this paper the Lima-Loureiro hypergeometric multiple orthogonal polynomials and the Jacobi-Piñeiro multiple orthogonal polynomials are discussed at the light of this bidiagonal factorization for tetradi... [▽ More](#)

Submitted 20 October, 2022; v1 submitted 13 October, 2022; originally announced October 2022.

Comments: This is the third part of the splitting of the paper arXiv:2203.13578 into three. 15 pages and 1 figure

36. [arXiv:2210.09388](#) [[pdf](#), [ps](#), [other](#)] [cond-mat.mes-hall](#) [cond-mat.stat-mech](#) [doi](#) [10.1103/PhysRevE.106.054127](#)

Wave transmission and its universal fluctuations in one-dimensional systems with Lévy-like disorder: Schrödinger, Klein-Gordon and Dirac equations

Authors: [Anderson L. R. Barbosa](#), [Jonas R. F. Lima](#), [Luiz Felipe C. Pereira](#)

Abstract: We investigate the propagation of waves in one-dimensional systems with Lévy-type disorder. We perform a complete analysis of non-relativistic and relativistic wave transmission submitted to potential barriers whose width, separation or both follow Lévy distributions characterized by an exponent $0 < \alpha < 1$. For the first two cases, where one of the parameters is fixed, non-relativistic and relativistic... [▽ More](#)

Submitted 17 October, 2022; **originally announced** October 2022.

Comments: Accepted for publication as a Regular Article in Physical Review E

Journal ref: Phys. Rev. E 106, 054127 (2022)

37. [arXiv:2210.06648](#) [[pdf](#), [other](#)] [astro-ph.HE](#) [astro-ph.SR](#) [gr-qc](#) [nucl-th](#)

3XMM J185246.6+003317: an isolated massive neutron star with a low magnetic field and a carbon atmosphere

Authors: [Rafael C. R. de Lima](#), [Jonas P. Pereira](#), [Jaziel G. Coelho](#), [Rafael C. Nunes](#), [Paulo E. F. Stecchini](#), [Manuel Castro](#), [Pierre Gomes](#), [Rodrigo R. da Silva](#), [Claudia V. Rodrigues](#), [José C. N. de Araujo](#), [Michał Bejger](#), [Paweł Haensel](#), [J. Leszek Zdunik](#)

Abstract: 3XMM J185246.6+003317 is a slowly rotating soft-gamma repeater (neutron star) in the vicinity of the supernova remnant Kes 79. So far, observations have only set upper limits to its surface magnetic field and spindown, and there is no estimate for its mass and radius. Using ray-tracing modelling and Bayesian inference for the analysis of several light curves spanning a period of around three weeks... [▽ More](#)

Submitted 12 October, 2022; **originally announced** October 2022.

Comments: 23 pages, 10 figures, 2 tables. Comments welcome

38. [arXiv:2210.05948](#) [[pdf](#), [other](#)] [physics.app-ph](#)

Non-Hermitian acoustic waveguides with periodic electroacoustic feedback

Authors: [Danilo Braghini](#), [Vinicius D. de Lima](#), [Danilo Beli](#), [Matheus I. N. Rosa](#), [José R. de F. Arruda](#)

Abstract: In this work, we investigate non-Hermitian acoustic waveguides designed with periodically applied feedback efforts using electrodynamic actuators. One-dimensional spectral (infinite-dimensional) and finite element (finite-dimensional) models for plane acoustic waves in ducts are used. It is shown that dispersion diagrams of this family of metamaterials exhibit non-reciprocal imaginary frequency components... [▽ More](#)

Submitted 14 October, 2022; **v1 submitted** 12 October, 2022; **originally announced** October 2022.

Comments: 40 pages, 22 figures

39. [arXiv:2210.05057](#) [[pdf](#), [other](#)] [astro-ph.CO](#) [doi](#) [10.1103/PhysRevD.106.123502](#)

Dark Energy Survey Year 3 Results: Measurement of the Baryon Acoustic Oscillations with Three-dimensional Clustering

Authors: [K. C. Chan](#), [S. Avila](#), [A. Carnero Rosell](#), [I. Ferrero](#), [J. Elvin-Poole](#), [E. Sanchez](#), [H. Camacho](#), [A. Porredon](#), [M. Crocce](#), [T. M. C. Abbott](#), [M. Aguena](#), [S. Allam](#), [F. Andrade-Oliveira](#), [E. Bertin](#), [S. Bocquet](#), [D. Brooks](#), [D. L. Burke](#), [M. Carrasco Kind](#), [J. Carretero](#), [F. J. Castander](#), [R. Cawthon](#), [C. Conselice](#), [M. Costanzi](#), [M. E. S. Pereira](#), [J. De Vicente](#), et al. (44 additional authors not shown)

Abstract: The three-dimensional correlation function offers an effective way to summarize the correlation of the large-scale structure even for imaging galaxy surveys. We have applied the projected three-dimensional correlation function, ξ_p to measure the Baryonic Acoustic Oscillations (BAO) scale on the first-three years Dark Energy Survey data. The sample consists of about 7 million galaxies in... [▽ More](#)

Submitted 12 December, 2022; **v1 submitted** 10 October, 2022; **originally announced** October 2022.

Comments: 20 pages, 12 figures, minor changes to match published version

Report number: DES-2022-0707, FERMILAB-PUB-22-728

40. [arXiv:2210.03846](#) [[pdf](#), [other](#)] [cond-mat.mes-hall](#) [doi](#) [10.1103/PhysRevB.106.245408](#)

Breakdown of topological protection due to non-magnetic edge disorder in two-dimensional materials in the Quantum Spin Hall phase

Authors: [Leandro R. F. Lima](#), [Caio Lewenkopf](#)

Abstract: We study the suppression of the conductance quantization in quantum spin Hall systems by a combined effect of electronic interactions and edge disorder, that is ubiquitous in exfoliated and CVD grown 2D materials. We show that the interplay between the electronic localized states due to edge defects and electron-electron interactions gives rise to local magnetic moments, that break time-reversal s... [▽ More](#)

Submitted 7 October, 2022; **originally announced** October 2022.

Comments: 6 pages, 3 figures

41. [arXiv:2210.03635](#) [[pdf](#), [other](#)] [math.CO](#)

Bounding the sum of the largest signless Laplacian eigenvalues of a graph

Authors: [Aida Abiad](#), [Leonardo de Lima](#), [Sina Kalantarzadeh](#), [Mona Mohammadi](#), [Carla Oliveira](#)

Abstract: We show several sharp upper and lower bounds for the sum of the largest eigenvalues of the signless Laplacian matrix. These bounds improve and extend previously known bounds.

Submitted 7 October, 2022; **originally announced** October 2022.

Comments: arXiv admin note: text overlap with arXiv:1412.0323

42. [arXiv:2210.00930](#) [[pdf](#), [other](#)] [physics.optics](#) [cs.ET](#) [physics.app-ph](#)

Multi-Wavelength Photonic Neuromorphic Computing for Intra and Inter-Channel Distortion Compensations in WDM Optical Communication Systems

Authors: [Benshan Wang](#), [Thomas Ferreira de Lima](#), [Bhavin J Shastri](#), [Paul R Prucnal](#), [Chaoran Huang](#)

Abstract: DSP (digital signal processing) has been widely applied in optical communication systems to mitigate signal distortions and has become one of the key technologies that have sustained data traffic growth over the past decade. However, the strict energy budget of application-specific integrated circuit-based DSP chips has prevented the deployment of some powerful but computationally costly DSP algor... [▽ More](#)

Submitted 3 October, 2022; **originally announced** October 2022.

43. [arXiv:2210.00553](#) [[pdf](#), [other](#)] [cs.CL](#)

ALT: A software for readability analysis of Portuguese-language texts

Authors: [Gleice Carvalho de Lima Moreno](#), [Marco P. M. de Souza](#), [Nelson Hein](#), [Adriana Kroenke Hein](#)

Abstract: In the initial stage of human life, communication, seen as a process of social interaction, was always the best way to reach consensus between the parties. Understanding and credibility in this process are essential for the mutual agreement to be validated. But, how to do it so that this communication reaches the great mass? This is the main challenge when what is sought is the dissemination of in... [▽ More](#)

Submitted 8 October, 2022; **v1** submitted 2 October, 2022; **originally announced** October 2022.

Comments: 21 pages, 13 figures, see software in <https://legibilidade.com/>

44. [arXiv:2209.10611](#) [[pdf](#), [ps](#), [other](#)] [hep-th](#) [cond-mat.mes-hall](#) [cond-mat.str-el](#) [math-ph](#) [quant-ph](#)

doi [10.1016/j.physletb.2022.137544](#)

The quantum scale invariance in graphene-like quantum electrodynamics

Authors: [O. M. Del Cima](#), [D. H. T. Franco](#), [L. S. Lima](#), [E. S. Miranda](#)

Abstract: The ultraviolet and infrared finiteness of a parity-even massless planar quantum electrodynamics mimics the scale invariance in graphene.

Submitted 21 September, 2022; **originally announced** September 2022.

Comments: In honor of the 80th birthday of Prof. Olivier Piguet, 7 pages

Journal ref: Physics Letters B 835 (2022) 137544

45. [arXiv:2209.08393](#) [[pdf](#), [other](#)] [hep-ph](#) [doi](#) [10.1103/PhysRevD.106.115020](#)

Unavoidable Higgs coupling deviations in the Z_2 -symmetric Georgi-Machacek model

Authors: [Carlos Henrique de Lima](#), [Heather E. Logan](#)

Abstract: The Z_2 -symmetric version of the Georgi-Machacek model does not possess a decoupling limit in which all the new particles can be made arbitrarily heavy, opening the possibility that the model can be entirely excluded if experiments reveal no deviations from the Standard Model. We explore this model, focusing on the part of parameter space in which the vacuum expectation value of the triplets,... [▽ More](#)

Submitted 22 November, 2022; **v1** submitted 17 September, 2022; **originally announced** September 2022.

Comments: 30 pages, 11 figures. small updates to references and discussion, version accepted for publication in PRD

46. [arXiv:2209.07772](#) [[pdf](#), [other](#)] [cs.CC](#) [cs.DS](#)

b -Coloring Parameterized by Pathwidth is XNLP-complete

Authors: [Lars Jaffke](#), [Paloma T. Lima](#), [Roohani Sharma](#)

Abstract: We show that the b -Coloring problem is complete for the class XNLP when parameterized by the pathwidth of the input graph. Besides determining the precise parameterized complexity of this problem, this implies that b -Coloring parameterized by pathwidth is $W[t]$ -hard for all t , and resolves the parameterized complexity of b -Coloring parameterized by treewidth.

Submitted 16 September, 2022; **originally announced** September 2022.

47. [arXiv:2209.06210](#) [[pdf](#), [other](#)] [cs.LG](#) [cs.AI](#) [cs.DC](#) [cs.DS](#)

Scheduling Algorithms for Federated Learning with Minimal Energy Consumption

Authors: [Laércio Lima Pilla](#)

Abstract: Federated Learning (FL) has opened the opportunity for collaboratively training machine learning models on heterogeneous mobile or Edge devices while keeping local data private. With an increase in its adoption, a growing concern is related to its economic and environmental cost (as is also the case for other machine learning techniques). Unfortunately, little work has been done to optimize its ener... [▼ More](#)

Submitted 13 September, 2022; **originally announced** September 2022.

48. [arXiv:2209.05853](#) [[pdf](#), [other](#)] [astro-ph.CO](#)

Dark Energy Survey Year 3 Results: Redshift Calibration of the MagLim Lens Sample from the combination of SOMPZ and clustering and its impact on Cosmology

Authors: [G. Giannini](#), [A. Alarcon](#), [M. Gatti](#), [A. Porredon](#), [M. Crocce](#), [G. M. Bernstein](#), [R. Cawthon](#), [C. Sánchez](#), [C. Doux](#), [J. Elvin-Poole](#), [M. Raveri](#), [J. Myles](#), [A. Amon](#), [S. Allam](#), [O. Alves](#), [F. Andrade-Oliveira](#), [E. Baxter](#), [K. Bechtol](#), [M. R. Becker](#), [J. Blazek](#), [H. Camacho](#), [A. Campos](#), [A. Carnero Rosell](#), [M. Carrasco Kind](#), [A. Choi](#), et al. (89 additional authors not shown)

Abstract: We present an alternative calibration of the MagLim lens sample redshift distributions from the Dark Energy Survey (DES) first three years of data (Y3). The new calibration is based on a combination of a Self-Organising Maps based scheme and clustering redshifts to estimate redshift distributions and inherent uncertainties, which is expected to be more accurate than the original DES Y3 redshift ca... [▼ More](#)

Submitted 13 September, 2022; **originally announced** September 2022.

49. [arXiv:2209.04869](#) [[pdf](#), [other](#)] [math.OC](#) [eess.SY](#)

Systems with both constant and time-varying delays: a switched systems approach and application to observer-controller co-design

Authors: [Thiago Alves Lima](#), [Matteo Della Rossa](#), [Frédéric Gouaisbaut](#), [Raphaël Jungers](#), [Sophie Tarbouriech](#)

Abstract: In this paper, we study the application of switched systems stability criteria to derive delay-dependent conditions for systems affected by both a constant and a time-varying delay. The main novelty of our approach lies on the use of path-complete Lyapunov techniques along with the proposition of a new modified functional to obtain convex analysis conditions while avoiding the need of computing a... [▼ More](#)

Submitted 11 September, 2022; **originally announced** September 2022.

Comments: Accepted for presentation at the 61st Conference on Decision and Control (CDC) 2022, Cancun, Mexico

50. [arXiv:2209.04706](#) [[pdf](#), [other](#)] [math.GR](#)

Bi-ordering almost-direct products of (reduced) free groups

Authors: [Oscar Ocampo](#), [Juliana Roberta Theodoro de Lima](#)

Abstract: In this paper, we show that almost-direct products of (reduced) free groups admit (reduced) Magnus ordering. Besides the application is already used to to well known groups, we use the main result to give an ordering of some subgroups of the automorphism group of free groups and also to give an ordering of pure monomial braid groups.

Submitted 10 September, 2022; **originally announced** September 2022.

Comments: 10 pages

MSC Class: 20F60; 20F36

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